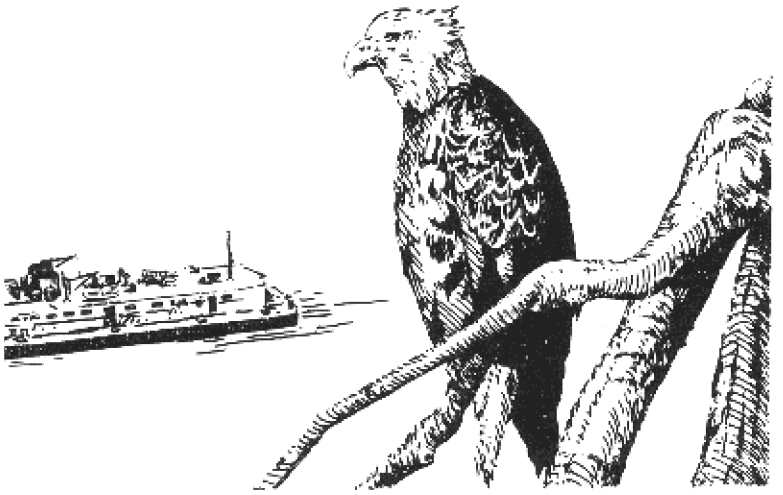
Chapter 5
he Illinois and Mississippi Canal



Interstate 80 enters Illinois from the east just below Chicago, moves west through a shallow valley in the rolling northern Illinois prairie, and crosses the Mississippi River to Iowa at Rock Island. A careful observer might occasionally notice a railroad track paralleling and crossing his route. At midpoint across the state he might be puzzled by a narrow band of water alongside the highway, with banks too straight to be natural; but unless he were a student of Illinois history, he would not be aware of what an important historic trail his car was following.

The railroad tracks, most recently used by the Rock Island Line, were laid down in the 1850's by the Chicago, Rock Island, and Pacific Railroad. In 1856 these tracks became the first to cross the Mississippi River, and bring: serious competition to the steamboat trade. The narrow band of water is the Illinois and Mississippi Canal, conceived even earlier, an outgrowth of the Canal. Era of early 19th century America. It was not built, however, until much later, at the and of the 19th century, as a

transportation route from the Mississippi to the Illinois River, and from there to the Great Lakes and the markets of the East.

Along this Illinois valley, then, lies a visual history of transportation in America: a representative of the age of waterway improvement, of the age of the railroad, and finally, of the age of the automobile and truck — all attempts to provide easy interchange between the East and the West for passengers, grain, raw materials and manufactures.

The lines followed by these three transportation routes also show who got there first. The railroad lies along the most level land of all at the bottom of the valley, connecting a string of small prairie farming communities. Roughly parallel to the railroad but on slightly more uneven land lies the canal, a seventy-five mile waterway from the Great Bend of the Illinois River just above the town of Hennepin west to the mouth of the Rock River at the Mississippi. Interstate 80, arriving last, had to be content with hillside.

Of all three, the story of the Illinois and Mississippi Canal is the longest and most complicated It is a history of both Illinois and national politics, of settlement patterns, of water and rail rivalries and changing transportation needs, and of the Corps of Engineers' relation to all of these.

The idea of an Illinois-Mississippi canal goes as far back as 1673, to Marquette and Joliet's explorations of the western shore of Lake Michigan. Joliet noted the advantages of a connection between Lake Michigan and the Mississippi and concluded that "there will be but one canal to make, and that by cutting only one half-league of prairie from the lake of the Illinois [Michigan] into the St. Louis [Illinois] River which empties into the Mississippi."[1]

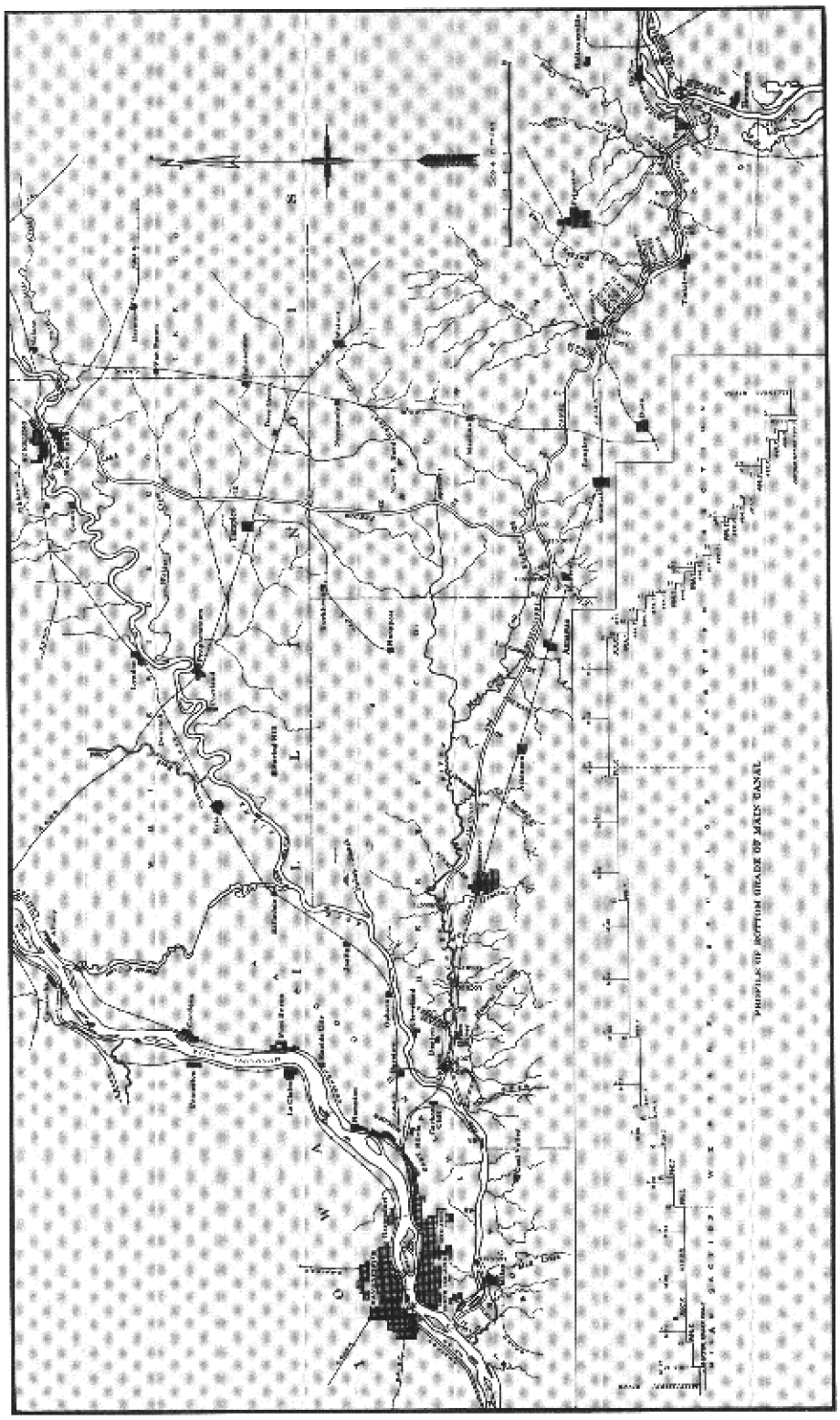
The explorer La Salle also pointed out the advantages of such a canal, and a hundred years later, in 1705, the French talked the Indians in the area into ceding the necessary land between Lake Michigan and the Illinois River.[2]

Following the Louisiana Purchase in 1803, Americans, too, became interested in improving on nature. Stephen Long suggested linking the two bodies of water while exploring western territories for the Topographical Bureau.

Little focused interest or planning was done, however, until the Erie Canal from Albany to Buffalo, New York, opened. Begun in 1847, it had begun to *pay* for itself in tow fees even before the entire 363 miles was completed in 1825. It brought tremendous growth to the cities along its path. The success of the Erie spawned a Canal Era in American history that saw more than 4,000 des of canal built or planned in the United States. This boom was partly responsible fer the State of Illinois' decision in 1834 to construct the Illinois and Michigan Canal connecting Chicago on Lake Michigan with the Illinois River at La Salle-Peru. When it was completed in 1848 after a number of starts and stops, the promise of its completion had already doubled the size of Chicago — to 20,000 in three years,[3] and was making Chicago a serious rival to St. Louis as a Midwestern transportation center.

The Illinois and Michigan Canal sent traffic down the Illinois River, but many residents of northern Illinois saw a canal extension west to the Mississippi at or near Rock Island as a natural second step. Goods traveling from Rock Island to Chicago via the Mississippi and Illinois Rivers had to travel 607 des. By canal across the state would be 188 des, a saving of 419 miles. Such a canal would give the growing towns of Davenport, Rock Island, Dubuque, and Burlington, Iowa, a commercial advantage.

The vagaries of bath Illinois and Federal politics and economics frustrated attempts at such an extension until near the end of the 19th century. The Illinois and Mississippi Canal, when it was finally authorized by Congress in 1890, came too little and too late. The vision behind it was still that of the old Cad Era of the 1830's; it was not designed for modern traffic. What traffic there was had already gone elsewhere — to the railroads. When the Illinois and Mississippi Canal finally opened to traffic in


PROFILE OF BOTTOM GRADE OF MAIN CANAL

1908, even river traffic on the Mississippi was experiencing a decline. The canal was suggested long before it could have been built, and built after it was no longer really needed — one of the first canals proposed in America and one of the last ones built.

The Illinois and Mississippi Canal, its commercial traffic down to less than 500 tons par year, was closed in 1951. After years of negotiations between the Federal government and the State of Illinois, it was made into a state park in 1970. It is now operated by the Illinois Department of Conservation as the Hennepin Canal State Parkway.

Map of the 67-mile Illinois and Mississippi Canal connecting ths Illinois River at Bureau with the Mississippi River at Rock Island. For shippers between St. Paul and Rock Island. the canal saved 419 miles over the previous route to the Great Lakes via the Illinois River. but it was completed just as a decline in river traffic set In, and Its use never came close to expectations.

On May 22,1978, the canal was entered in the National Register of Historic Places, a tribute ta it a long and important history. It remains today as the most complete canal system remaining of all the canals built during the Canal Era of American transportation.

Early Surveys *and Plans.* Formal proposals for a canal from the Illinois River to the Mississippi began as early as 1832, when a group of local residents gathered by Dr. Augustus G. Langworthy met at Hennepin, Illinois, to call for construction of such a canal. This may have been the same mating reported as taking place in 1834 by Joseph Galer, a new Illinois settler and former construction superintendent on the Erie Canal. Galer reported that he took his

> blanket and gun and viewed the country through from Hennepin to the Mississippi River near Rock Island and thought it a natural pass for a canal as there was a depression all the way across with high land on either side. I reported my discovery but was much ridiculed for holding such ideas.[4]

Galer reported that he convinced Dr. Langworthy, who owned land near Tiskilwa on the proposed route, that there "might be dollars and cents in it."[5] The group organized by Dr. Langworthy printed circulars and lobbied the Illinois General Assembly for state financing, but any potential interest was cut, short by the Panic of 1837. Little more was done until the Civil War renewed fears of the stranglehold the Southern ports had over goods moving on the Mississippi.

The Langworthy meeting turned out to be the first of a series of larger and larger "canal conventions" meeting at various locations in Illinois and Iowa for the next 50 years. Settlers in northern Illinois had come primarily from New England, there were increasing numbers of them after the Civil War, and they naturally looked to the East as their market as well as for their roots. A convention at Davenport, Iowa, in 1864 convinced the General Assembly of Iowa to petition far a canal. Similar conventions in Geneseo, Illinois, in 1866, and at Rock Island in 1874 (attended by 900 representatives) and in 1879 culminated in a seven-state convention at Davenport in 1881. Here 400 representatives of farm, commercial, and local government groups authorized a Hennepin Canal Commission. Representatives of this commission met with Chicago groups to stir interest in a anal, and they also secured passage of a resolution in the Illinois General Assembly calling for Federal construction of the canal. Two members of the commission who were strong proponents of the canal, Major S.J. Allen of Geneseo, Illinois, and Iowa Congressman John Murphy of Davenport, visited officials in the East to gain support for their cause and to stress the fact that the canal was of national, not merely local, significance.

Allen and Murphy met with most success in New York State. Grain and other Midwestern commodities shipped cheaply down the Mississippi to New Orleans and from there to the East coast ended at the port of Baltimore, a rival to New York City. New York interests saw the Hemepin Canal, with it3 transportation route to the Great Lakes and the Erie Canal, as restoring their competitive edge.

The first actual survey for an Illinois-Mississippi canal routs was made in 1866 by a civil engineer, J.O. Hudnutt, hired by several citizens of Dixon, Illinois. The canal proposed by Hudnutt ran from Hennepin to Watertown on the Mississippi (in the center of the Rock Island Rapids)with a feeder from the Rock River at Dixon. The Hudnutt survey was for a canal 60 feat wide at the waterline, 6 feet deep, with locks 150 by 21 feet. Hudnutt estimated the

total cost at $4,500,000, or about the same as Warren's proposal for the Wisconsin River to Green Bay route a year later, and much less than Wilson's estimate for the Illinois River route.

Residents, politicians, and commercial groups in north-central Illinois, and in the Davenport-Rock Island area realized that neither the Wisconsin River route to the north nor the Illinois River route to the south would benefit them as much as these routes would benefit other areas such as St. Louis and St. Paul. Agitation for a canal route through this mid-area continued. The election of General Grant, a resident of Galena, Illinois, as President in 1868 kept those hopes alive.

In 1870 Congress authorized the first Government survey for an Illinois-Mississippi canal. This survey was made by Graham P. Low under the direction of J.N. Macomb, District Engineer at Rock Island. The route selected by Low followed the Hudnutt survey closely, both on the main line and on the feeder to Dixon. Low's survey was for a "ship canal" 160 feet wide at the waterline and 7 feet deep. The 350-foot by 75-foot locks were intended to correspond with (and compete with) those planned for improvement of the Illinois River. The estimated cost of the canal was $12,479,693.

Low and Macomb also submitted a plan for a more modest "commercial canal" of the same dimensions proposed by Hudnutt, the only difference being composite locks. This cost estimate was $3,899,722.

No action was taken on this report, but in 1872 President Ulysses S. Grant convinced the Senate to appoint a committee to study the advantages of such a canal. The committee reported that the canal would be an excellent regulator of railroad rates, but no further action was taken.

The regulation of rail rates was a constant argument used by proponents of the Hennepin Canal, with some justification. In 1880 coal was shipped from Buffalo and Erie to Chicago by water — 900

miles for 64¢ per ton. This same coal was then loaded on trains and shipped to Rock Island and Dubuque — 150 to 200 miles — for $2.00 per ton. Canal proponents felt that with a canal, the price would drop to 50¢ per ton.[8]

A second Government survey was authorized in 1874 as part of a larger study of transportation routes to the seaboard. Due to lack of time, only the Illinois and Michigan, Canal was resurveyed. For an Illinois-Mississippi canal, the lines laid down in 1870 were adopted, from Hennepin to Watertown. The cost estimate, with more modest 170- by 30-foot locks, was $4,541,000.

Not until 1882 did a Hennepin Canal bill actually come before Congress. The House Committee on Railways and Canals reported favorably on a $1,000,000 appropriation for the canal. The Senate Committee on Commerce amended this to $100,000, and the House further reduced the appropriation to $30,000 for a *survey* of the route as part of a compromise bill.

The Hennepin Canal was having difficulty because many congressmen were reluctant to support what they considered a local project, totally within one state, with Federal funds. There was also opposition from the South and from the Lower Mississippi Valley, especially from St. Louis, all of whom saw the canal as a threat to their own commerce. Finally, the Illinois and Michigan Canal which had once been so successful was now too small (it had been a traffic bottleneck an the Illinois waterway since 1851) and was rapidly deteriorating. Any national importance the Hennepin Canal might have depended, of course, on this access to Lake Michigan.

The Act of August 2, 1882, as finally passed, directed the Secretary of War to survey and locate a canal from the Illinois River at or near Hennapin to a point on the Mississippi River at or above Rock Island where practical or convenient, with a feeder from the main line to a convenient point on the Rock River. Both the canal and feeder were to be not less

than 80 feet wide at the waterline, with locks not less than 170 by 30 feet, with a 7-foot depth throughout. The actual size was to be governed by "the minimum draught of the boats at the most unfavorable stage of the main river." The Act also authorized a survey of the old Illinois and Michigan Canal with a view to enlarging it, a necessary part of the success of the whole system.

These surveys were assigned to Major W.H.H. Benyaurd of the Chicago District, who was aided on the Hennepin Canal part of the survey by an assistant engineer, H.B. Herr. The survey by Herr and Benyaurd followed much the same route from the Illinois River a3 earlier surveys for the first 18 miles. From here, however, it went much further north than previous routes, through a low marshy area known at the Marais d'Osier [willow marsh) which connected the Rock River with the Mississippi. During periods of high water on the Mississippi, this whole area flooded, allowing steamboats a shortcut between the two rivers. The Marais d'Osier route as surveyed By Benyaurd ended near Albany, Illinois, about 14 miles above the head of the Rock Island Rapids.

Before the survey of the Marais d'Osier routs was finished, Rock Island and Moline interests cornplained about the departure from earlier proposals. Rock Island preferred the earlier outlet at the mouth of the Rock River, while a very vocal group of Mqline residents favored Hudnutt's Watertown outlet near Campbell's Island. Along with the Watertown route, the Moline residents suggested a dam across the Mississippi at the foot of the rapids in order to provide water for the channel at Watertown, and also, incidentally, to provide Moline with a better waterfront and additional waterpower. Bowing to these pressures, Benyaurd surveyed all three routes, though awing to the lateness of the season, only the Marais d'Osier was thoroughly surveyed.

In his report of March 31, 1883,[9] Major Benyaurd recommended the Marais d'Osier route. It was the shortest: 64.5 d e s, compared to 65.2 for the

Watertown route and 74.5 miles for the Rock Island mute. Further, land along the Marais d'Osier route was easier to excavate, more level, with fewer lockages required. The number of accessory works — bridges, stream crossings — would be half of what either the Watertown or Rock Island routes would require.

One of the strongest advantages of the Marais d'Osier route, from Benyaurd's point of view, was the natural basin adjacent to the outlet and outside the main channel of the Mississippi, where steamboat3 could wait for lockage. Not only was there a basin in the Mississippi, but the first lock at Marais d'Osier was 6½ miles from the river, an additional safe place for any number of waiting boats. Benyaurd proposed to excavate a channel here to 7 feet below low water on the Mississippi. During high water. the entire area would flood, adding even more to the space available to boats waiting to use the lock.

By contrast, the Watertown route left no natural slackwater for boats to tie up: the first lock would be right at the outlet into the river. Because this route ended in the middle of the Rock Island Rapids, a channel would have to be excavated through rock nearly a mile across the river to the Iowa side to the improved 4½-foot channel of the Mississippi. The dam across the Mississippi proposed by the Moline proponents of the Watertown route to raise the level of water on the whole rapids was universally opposed by the rafting industry and other commercial river interests, and also by past Corps policy.

The Rock Island mute was somewhat easier to engineer than the Watertown route, but since its first lock, too, was near the river, a pool would have to be dredged to provide apace for waiting boats.

In his choice of the Marais d'Osier route, Benyaurd assumed that the primary use of the canal would be by grain shippers to the north and west of the canal. For these users, the rapids south of Watertown would be no problem. Statistics seem-

ed to support Benyaurd's assumption. Wheat production in this area of the Upper Mississippi had grown from an aggregate of 50 million tons in 1849-1860 to 195 million tone in 1860-1870, and to 375 million tans from 1870-1881.[10]

Further surveys for these three canal routes were continued in 1885-86 by Major Thomas Handbury when Benyaurd became ill. Handbury's supplements to the 1883 report, published in the *Annual Report* for 1886, actually considered five routes for the western section of the canal, with the feeder to Dixon and the section east of the summit level remaining the same. Handbury supported Benyaurd's choice of the Marais d'Osier route from both an engineering and economic standpoint. He estimated the cost 3t $5,811,367. The next least expensive route was to Watertown via Penny's Slough, a new path surveyed by Major Handbury which would utilize a long stretch of natural Rock River channel. The estimate for the original Watertown route along the Green River, surveyed in 1882, was $7,207,649, the most expensive of all.

The two Rock Island routes, via Penny's Slough as surveyed by Major Handbury, and along the Green River as surveyed by Benyaurd, were estimated to cost $6,554,052 and $6,709,536 respectively. The feeder to Dixon on the Rock River, common to all routes, was estimated to cost $1,664,117.

Boards of Engineers in 1886 and again in 1887 met to review Benyaurd's and Handbury's recommendations. Both boards agreed with the choice of the Marais d'Osier routs. However, the Secretary of War and Brigadier General John Newton, Chief of Engineers, while agreeing that the Marais d'Osier route was best from an engineering standpoint, felt that Benyaurd was wrong in assuming that the heaviest use of the canal, would be from grain shippers going east. They felt instead that much of the traffic would be "western bound heavy freight which, from Rock Island as a terminus of the Canal, would be sent downstream for the supply of numerous towns and cities on the Mississippi banks."[11] For such cargo, and for the coal that was

arriving in larger and larger amounts at Chicago from the coal fields of Pennsylvania and from Chicago to growing Midwest industries, the rapids would be a formidable obstacle, should the anal be upstream. General Newton, perhaps thinking of the Rock Island Arsenal, also noted the military advantages of the Rack Island route, and recommended that this one be chosen.

Continued protests from the Moline group helped keep a canal bill from succeeding in 1887, but the River and Harbor Bill of August 11, 1888, brought the Hennepin Canal one step closer in two ways. First, in order to change the image of the canal as a local project bounded by a single state to a project of national significance, Congress changed the name from the Hennepin Canal to the Illinois and Mississippi Canal. Official correspondence shifted to this new name, and the Corps of Engineers used the name in all subsequent surveys and plans, construction, and operations, but the name "Hennepin Canal" remained it3 popular name among nearly everyone else. Its present status as the Hennepin Canal Parkway State Park shows that its nickname has outlasted its official name.

A second part of the act authorized the Corps of Engineers to submit detailed plans and estimates of cost, and to locate the route. The proportions authorized by the act were in line with the smallest dimensions of the earlier surveys. The canal was to be 80 feet wide at the waterline, with a depth of not less than 7 feet. The locks were to be 170 by 30 feet.

The work of preparing these plans and drawings was assigned to Captain William L. Marshall, who had replaced Handbury as District Engineer at Chicago on April 1,1888. Prior to this, Marshall had been in charge of improvements on the Fox and Wisconsin Rivers, where he had become familiar with locks and dams.

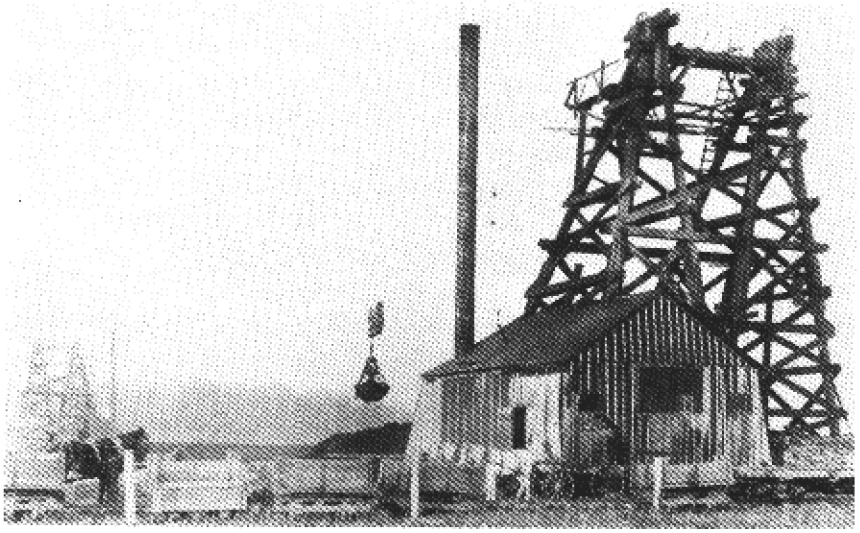
Marshall's orders to "locate" the canal line was not clear, but he received clarification from the Secretary of War on October 27, 1888. "Locate" meant the Rock Island route, a decision which finally determined where the canal would enter the Mississippi,

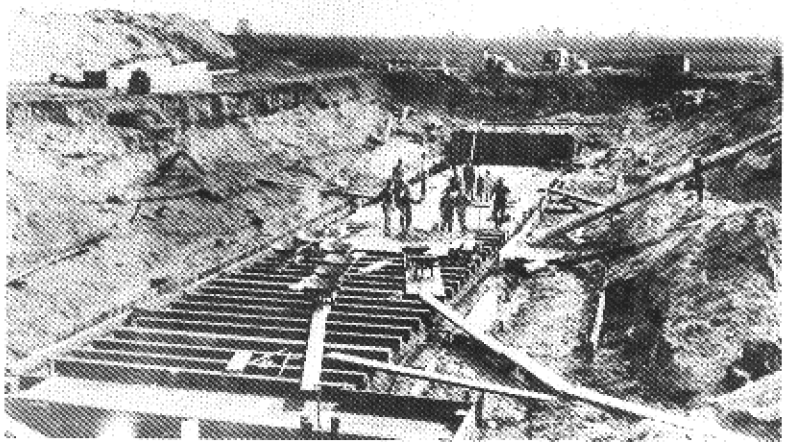
On January 2, 1889, Captain (now Major) Marshall began compiling the results of previous surveys. Based on these early reports, he located the line of the canal generally along the Penny's Slough route surveyed by Handbury in 1885, with a feeder to Dixon. Marshall's assistant engineer, G.A.M. Liljencrantz, was in charge of locating the canal, while Marshall was responsible for all the mechanical design. and construction: locks, lock foundations, gates, valves and maneuvering gear. The lock design was similar to those Marshall had seen used on the Fox River by Colonel D.C. Houston. The following year, on June 21, 1890, Marshall published a "Final Report upon Location, Plans, and Estimates of the Illinois and Mississippi canal" as past of his Annual Report to the Chief of Engineers.

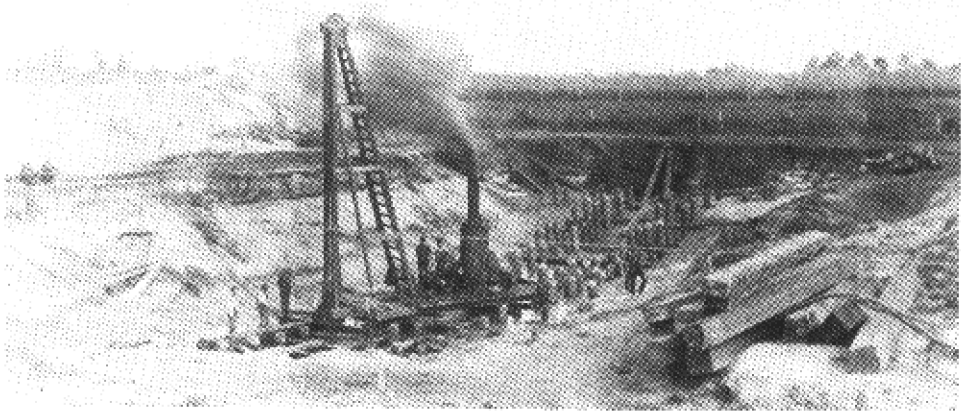
This report, with a cost estimate of $6,925,960, was presented *to* Congress. Victory for canal proponents came on September 19, 1890, when the River and Harbor Bill authorized the first $500,000 for a canal from Hennapin to Rock Island. The bill followed the dimensions of 1888, stipulating that the canal have a capacity for vessels of at bast 280 tons burden. An additional stipulation that was to become important to the canal provided that at the discretion of the Secretary of War, the dimensions of ths canal in any part could be enlarged "if in his opinion the cost of said improvement is not thereby increased."[12] The bill also provided for construction of all bridges, lock houses, and other structures necessary to operate the canal.

Construction. Marshall began locating the line in November 1890. He had been joined in March of 1890 by two *assistant* engineers, L.L. Wheeler and James C. Long, who remained with the canal project throughout its construction. Wheeler was a civil engineer who had worked with the Mississippi River Commission prior to the! canal project. He became superintendent of the canal when it opened, and transferred to the Rock Island District along with the anal.

The line of the canal began at the Great Bend of the Illinois River (where the river turned south







toward St. Louis), 1.75 miles upstream from Hennepin. From here it ran along the valley of Bureau Creek to the summit level 18 miles west. From the summit level it angled north to meet the Rock River at Penny's Slough. The remainder of the canal, except for a 4-mile section around the Rock River Rapids at the Mississippi, ran in or along the channel of the Rock River. The feeder ran from the summit level north to meet the Rock River at Dixon.

One of the many innovations developed by the Engineers for the canal was this twin overhead cableway with orange peel buckets. When a soft, peaty section of the canal known as Cecil's Slough proved impossible for contractors to excavate, this cableway, its two towers riding on rails along opposite banks, did the job.

On April 28-29, 1891, the Illinois Senate and House by joint resolution ceded to the United States jurisdiction of lands acquired for the right-of-way of the canal.

For construction and supervision purposes, the canal was divided into five sections: eastern, western, feeder, Rock River pool, and Milan. James C. Long had local charge of the eastern section, L.L. Wheeler supervised the Milan, western, and feeder sections, while the Rock Island District supervised the improvement of the Rock River pool. Construction of the Illinois and Mississippi Canal began at the Milan section in 1892 and ended at the head of the feeder section in 1907.

All of the lock foundations at the canal were constructed by pouring concrete over a wooden grill resting on pilings.

One policy decision made at the beginning of construction created later problems. Perhaps owing to the annual and uncertain nature of Congressional appropriations, Marshall decided to acquire right-of-way for the canal as needed, rather than all at once prior to construction. Under this policy, right-of-way for the Milan section was acquired in 1891-92, for the eastern section between 1893 and 1898, for the western section in 1897, for the feeder section between 1896 and 1901, and for the land taken by Lake Sinnissippi (created by the backup of the Rock River behind the Government dam at Sterling) in 1905-06.

A pile driver driving piles for a lock foundation.

As necessary as such policy may have been, it frustrated both the cost estimates and the construction of the canal. Land values rose rapidly during the 1890's, and even without significant land speculation, the cost of the right-of-way more than doubled from the 1883 survey on which the 1890

estimates were made. Continued litigation also held up construction. Marshall estimated in 1895 that if the entire right-of-way had been obtained at once, the whole project could be finished in two years. Instead, 15 years elapsed between the first shovel of dirt and the first boat in the canal.

Milan Section. The Act of 1890 specified that construction of the Illinois and Mississippi Canal begin with the 4½-mile section around the Rock River Rapids near Milan, Illinois. There were two reasons for this. First, the Milan section was a self-contained unit that could be used by itself as soon as completed, and thus show visible progress on the project. It used water from the Rock River rather than from the feeder. Second, a heavy use was predicted for this section. Rock Island had become a primary coaling station for steamboats on the Mississippi, and the Milan section would provide access to the extensive coal fields of western Illinois in the immediate vicinity of the canal.

The Government work force on the canal itself intended to be one of the heaviest users of this section. Sand and gravel needed for construction of the remainder of the canal were located at Milan, while the rock used for the revetment of the canal banks was to come from excavations on the Rock Island Rapids.[13]

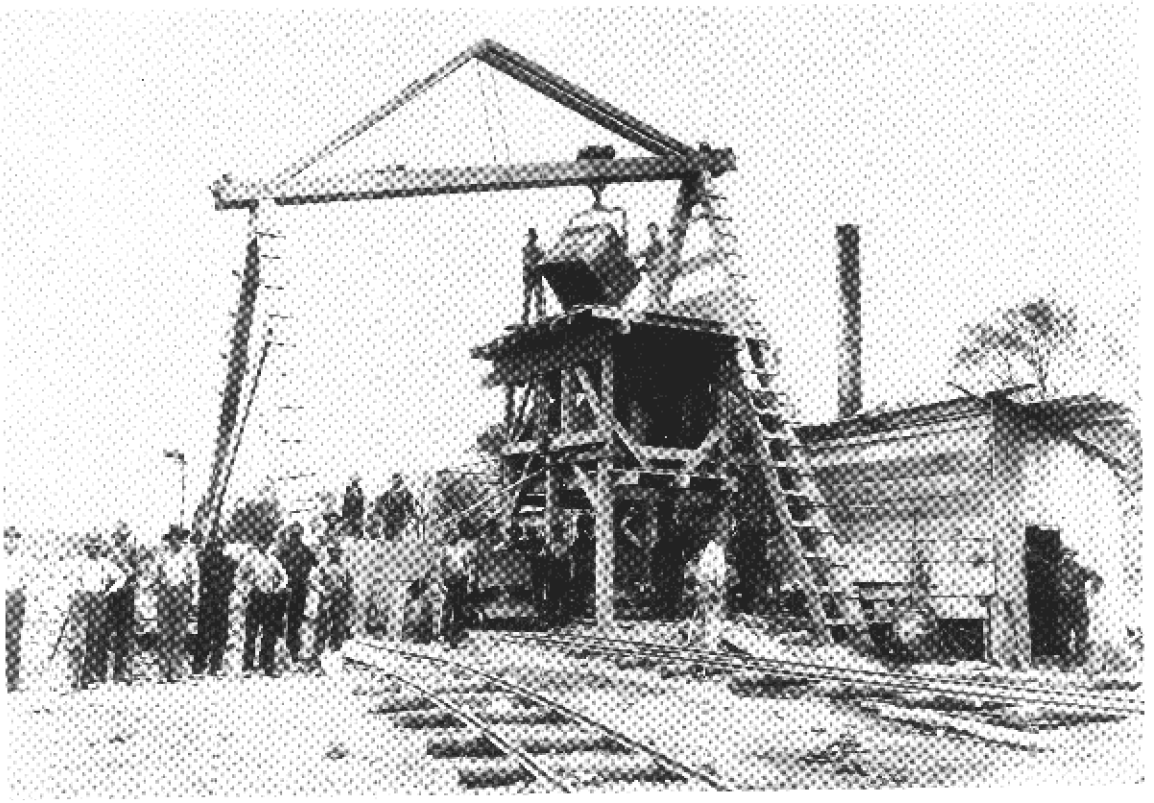
L.L. Wheeler established an Engineer Office at Milan in order to supervise final plans and construction of the Milan section. It soon became clear that the original route of the canal around the rapids via the north shore of the Rock River would be difficult. Dams would have to be built across all arms of the Rock River in order to provide enough water, and the discharge rate of the river turned out to be too small to permit the planned wing dams from satisfactorily scouring the upstream channel. The north bank was also heavily settled, with the Sears Water Power Company plant posing a major difficulty.

Wheeler discovered a much easier and more practicable route on the south side of the river. The

Secretary of War approved this new route on March 25, 1891, but an immediate objection was raised by Rock Island citizens who complained that a south route would make railroad and wagon access impossible. A Board of Engineers met in Rock Island on September 7, 1891, to listen to objections, but on September 24, 1891, they recommended Wheeler's southern route.

Another much more important alteration in canal plans prim to construction *came* early in 1891 when Marshall requested permission to use poured concrete for the lack walls and other structures rather than the traditional cut stone specified in the original plans. Marshall had experimented with concrete construction before coming to the Chicago District when he served as a consulting engineer for a project to protect the lakefront off Chicago's Lincoln Park. Concrete had already seen some use in such construction in France and elsewhere in Europe, and it had been used in the United States far fortifications. Marshall was convinced that concrate would make sound structures.

Marshall pointed out that the stone available in the area — primarily Joliet limestone — was of inferior quality, expensive, and difficult to transport, while "nearly everywhere along the line of the canal is found a good quality of silicious sand and gravel, which, by an admixture of the best quality Portland cement will make an artificial stone which will be as hard as and better resist the action of the elements than the native building stone."[14] It was also, Marshall pointed out in hi3 request, much less expensive — a ratio, he estimated of 10 to 17 in favor of artificial stone. This was an important, consideration. The 1890 bill had given the Secretary of War power to change the dimensions of the canal if the expense was not increased. Marshall noted in hi3 request that the use of concrete would save enough money to permit increasing the width of the locks to 35 feet, bringing the canal somewhat more in line with the newer barges and boats being built by the 1890's. Finally, Marshall noted, concrete construction would make "& great experiment in river construction,"[15] which, if successful, could revolutionize the many river improvement projects then in the planning stages.



In order to mix the amounts of concrete needed for the lock walls, Wheeler and Captain Marshall designed this elevated concrete mixer holding five barrels at a time. Carts on tracks carried the concrete to the lock site.

Marshall proposed a secondary experiment in the use of concrete: the use of Portland cement rather than imported European cements commonly used at the time and considered vastly superior to the American product. Marshall was convinced that Portland cement was at least as good as imported cement.

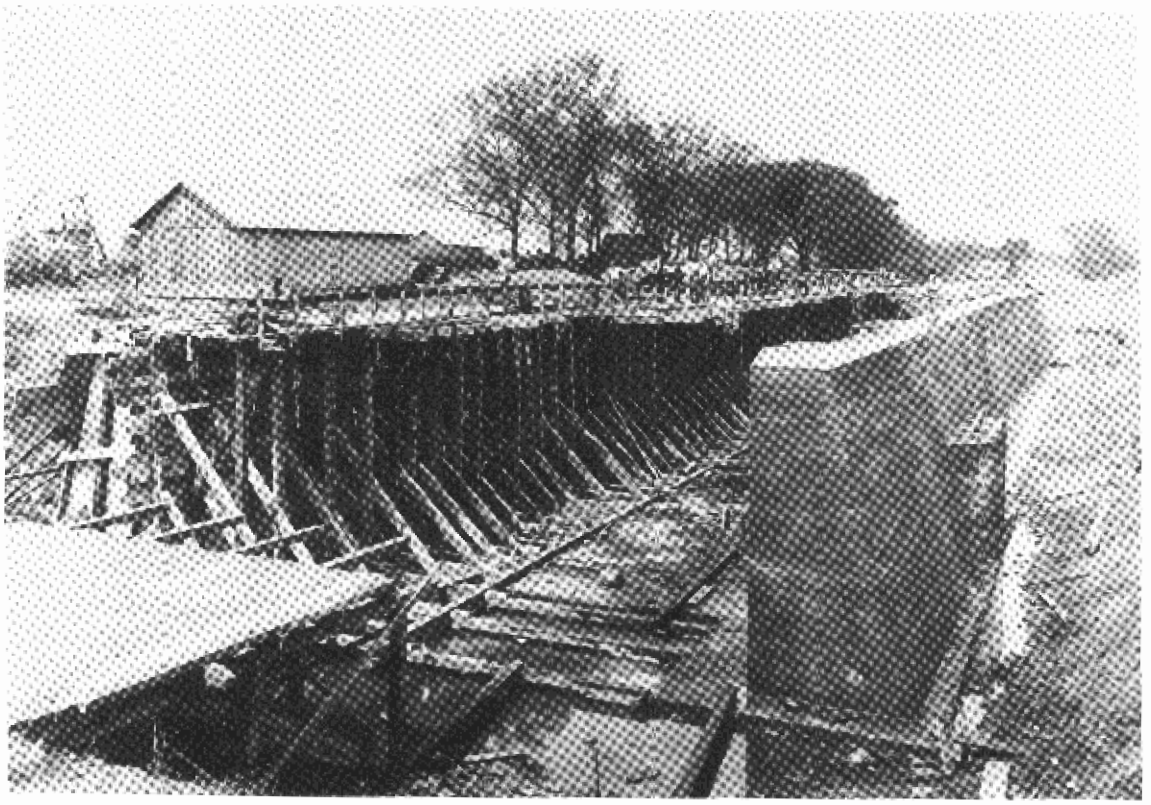
On May 11, 1891, the Secretary of War authorized Marshall to use concrete construction and to increase the canal lock width to 35 feet.

In order to construct the locks of concrete, Marshall and Wheeler had to devise entirely new building methods. The minimal use of concrete that had been done before relied on old-fashioned, slow methods. The usual practice was to pour the concrete into the forms in horizontal *layers,* letting each layer partially harden overnight before adding another layer. The result, particularly if the layers were not carefully levelled each time, was a layer

cake of separate sections. These "planes of weakness" weakened the whole structure by allowing water to seep in.

Cement was also mixed a barrel at a time. An occasional weak or defective barrel created other soft spots in the structure. Marshall also felt that the traditional practice of finishing or plastering the surface with a thin coat of cement weakened the whole.

While a consulting engineer for the Commissioners of Lincoln Park, Marshall had developed a batter method of pouring concrete walls, and he determined to adapt this method to the canal lock walls. First, he constructed the wooden forms for the walls in vertical rather than horizontal sections, and poured the concrete into alternate vertical sections. The filling of each lock wall was done without intermission, using three shifts of workers around the clock where necessary, so that the wall was one



Construction proceeding on the south wall of Lock 36, showing the timber reinforcing forms designed by L. L. Wheeler to hold the poured concrete. The finished north wall shows the end result.

homogeneous mass rather than a layered structure. With 68 men on each shift, an entire lock superstructure could be finished in a week. After a wall had been poured, it was kept wet for three weeks to give additional hardness to the concrete. To insure that no weak barrel could damage a wall, Marshall mixed five to ten barrels of cement together at one time, minimizing the effects of a bad barrel.

The wooden forms for the lock walls were designed by Wheeler to hold up under the tremendous pressure of such masses of concrete. The inside of the forms had to be much smoother than ordinary, since the walls were not surfaced or plastered when the forms were removed.

Special equipment had to be designed to mix the concrete. Previous contractors had mixed each batch by hand or by the use of small mixers. These techniques were employed at the canal post factory to make cement fence and telephone poles, and for other small amounts of concrete; but for the massive amount of concrete needed for the lock walls, Wheeler designed an elevated cement mixing machine. Large amounts of cement could be mixed and poured into cars underneath and taken continuously to the construction site.

The methods and machines devised by Marshall and L.L. Wheeler for the Illinois and Mississippi Canal became standard practice in the industry. Their methods were especially important to the new Panama Canal construction, but they helped revolutionize building practices in the United States, too. *The canal was as important as an experiment as it was for its commercial navigation use.*

Marshall's faith in Portland cement was another experiment that worked out; it helped make the United States less dependent on imported cement. As part of his experiments at the canal site, Marshall did extensive tests of Portland cement, and the grades and specifications he established became standard in the industry.

Meanwhile, Wheeler continued work on the Milan section. By June 1892, plans were complete and contracts had been let for three miles of canal trunk, for three lock foundations, and for sand and gravel. A3 on the remainder of the canal, most of the actual construction was bid aut to private contractors.

The first actual construction of the Milan section began in July 1892 when Wheeler turned over the first spade of dirt. The spade is now in the Historical Society in Davenport.[16]

Construction had no sooner begun when, on August 1, 1892, the new 8-hour work day took effeet. Wheeler had submitted contracts to the Secretary of War for approval prior to this, but they did not arrive until after August 1. Wheeler's estimates were based on a 10-hour work day, and these now had to be revised, adding 25% to the cost of labor here and elsewhere on the canal.

Work went smoothly on the Milan section, and it was completed by November 1894. The work consisted of two dams across the a m of the Rock River at the head of the rapids, with *seven* hinter gates to control the water level; 4½ miles of canal prism, of which about 4,000 feet consisted of embankments in the bed of the river; one guard lock and two lift Locks, seven sluices, one culvert, and two metal swing bridges.

Water was turned into the canal on November 29, 1894, and the Milan section opened to navigation at ceremonies led by Wheeler an April 17, 1895. At this ceremony Captain W.C. Clark of Buffalo, Iowa, a steamboatman, noted that the locks were too small for the barges then being built — a prophetic statement.[17]

The Rock Island District completed the Rock River pool section of the canal — essentially a dredging operation — in conjunction with the Milan section from an 1892 appropriation.

Use of the Milan section was temporarily limited to passenger and excursion boats due to three

restrictive bridges — the Moline Wagon Bridge and two railroad bridges — across the canal, These bridges prevented the passage of boats requiring more than 11 feet of headroom.

For the next five or six years, however, the Milan section of the canal was used heavily by both Government plant and local shippers: more use, ironically, than the completed canal would ever receive. Peak years for the Milan section came in 1899-1900, when the locks competed easily with the larger locks recently completed at LaGrange and Kampsville on the Illinois River. During July 1899, for example, when lockages on the Illinois River were below 100, there were 292 lockages through the Milan locks by 84 different steamers and 59 barges, with 713 passengers. October of 1899 saw 454 lockages.[18] In 19-01and 1902, however, the coal fields in western Illinois began closing, victims of competition from better coal elsewhere, and the use of the Milan section declined, still used heavily only for work on the canal itself.

On March 30, 1901, operation and care of the Milan section was transferred from Major Willard (who had replaced Marshall on December 31, 1899) of the Chicago District to Major Curtis McD. Townsend, District Engineer at Rock Island. This transfer was part of a realignment of the Chicago District. On June 24, 1901, much of the work involving Chicago lakes and harbors, and improvement of the Illinois River was assigned to Colonel O.H. Ernst, Division Engineer of the Northwest Division. Major Willard was assigned to a newly created Second Chicago District, consisting of the Illinois and Mississippi Canal and the operation and care of the locks at LaGrange and Kampsville.

Major Willard remained in charge until July 31, 1903, when he was relieved by Major Charles Riche. Riche turned the work over to Major W.H. Bixby on April 20, 1905, after being assigned as District Engineer at Rock Isknd. On April 30, 1906, Riche again assumed command of the Second Chicago District, while retaining hi3 responsibilities at Rock Island as well. Although Riche maintained a

Chicago office, the work was consolidated from then on at Rock Island, until the Second Chicago District was dissolved on February 18, 1911. On March 31, 1911, the entire Illinois and Mississippi Canal was transferred to the Rock Island District.

Eastern Section. Work on the eastern section of the Illinois and Mississippi Canal, mile 1 to mile 24, began under James C. Long in 1894. From here on though the western and feeder sections, construction procedures remained much the same. The canal prism was constructed first, followed by the locks and other structures. The prism was divided into sections of about four miles, and let out to private contractors in bids covering me mile each.

The prism of the canal was constructed in three ways, depending on the terrain: entirely above the level of the surrounding ground, entirely excavated below ground level, and partially excavated and partially embanked. Where the prism was entirely embanked, the banks were 10 feet wide at ths top; where the embankment was partial, the top was 8 feet wide. Those sections of the prism entirely below grade had a tow path 16 feet wide and 2½ feet high along one bank, The slope of all banks on the canal was 1 on 2 inside the prism and 1 on 1½ on the outside.

The feeder line was totally *embanked,* most of the western section was excavated; while much of the eastern section was partially excavated and partially embanked.

The right of way for the canal was at bast 300 feet. wide for the entire main line and feeder. At places, however, it was as much as 1,000 feet wide to accommodate turnouts for passing boats every four or five miles along the line, and for the shops and warehouses needed to operate the canal. The canal prism was also wider above and below each lock. The prism of the main line and feeder was 52 feet wide at the bottom and 80 feet wide at the waterline.

Embankments on the eastern section tended to be high due to the rapid drop from the summit level to

Fill was hauled to the embankments by locomotives carrying dump cars along temporary tracks atop the embankment

the Illinois River: 196 feet in 18 miles, with 21 locks whose lift3 varied from 6 to 12 feet. Because of this, horse-drawn teams had difficulty hauling fill and supplies for the embankments. In order to alleviate the problem, Long had a narrow 3-foot gauge railroad built from mile 2 to mile 17 to carry supplies. Two small engines, the "Davenport" and the "Hennepin," hauled carloads of fill to the embankments in this area. A short section of railroad was also used at mile 24, a peaty area known as Devil's Slough, to bring supplies to the 30 teams and 40 laborers constructing this mile of bank. For this site, Long devised a "movable trestle" from which the train cars dumped material where it was needed.[19]

By 1900 the prism, lock walls and foundations, and most of the other structures (bridge abutments, culverts, etc.) were complete in the eastern section. There was one major exception. Mile 20 through mile 23 crossed a peat bog known as Cecil's Slough where decayed vegetation lay 20 to 50 feet deep,

making both drainage and excavation difficult. Alternate routes for the c a d had been considered as early as 1893. A construction contract for these three miles was let with the Globe Construction Company of Cincinnati, Ohio, in 1897, but two years later when their contract expired they abandoned the work only 30% completed. Not only was the peat soft and hard to maintain in the bank, but Pond Creek, which drained Cecil's Slough, crossed the line of the canal several times in three miles, creating drainage problem.

Several alternate routes were again considered, but a Board of Engineers on June 8, 1901, decided to keep the original line. This Board, together with Major Willard, worked out an ingenious solution. They determined to excavate Cecil's Slough by a specially designed cableway. Two wooden towers were constructed and located on each side of the prism, 525 feet apart. The movable towers were 57 feat high, with 45-foot-square bases, resting on 24 pairs of standard gauge car wheels and trucks, which moved on five steel rails along the excavation route.

From the top of each tower was suspended twin main cables 2½ inches in diameter. Two conveyors travelled on these cables, each carrying a 1½-cubic yard orange peel bucket. The conveyors moved back and forth on the main cables by $^{7}/_{8}$-inch endless wire cable connected to a drum on the head tower. The buckets were hoisted and lowered by a %-inch cable attached to a second drum, and opened and closed by a second ¾-inch cable attached to closing pulleys. With a 125-horsepower steam engine operating each bucket, this "duplex cableway" was capable of making 40 trips per hour. The Cecil's Slough excavation was completed by the Government using this invention and hired labor.

Western Section. The final report of plans for the Illinois and Mississippi Canal submitted to Congress by Marshall in 1890 called far the western section of the canal to head northwest from the summit level to Penny's Slough, and from there down the channel of the Rock River to Milan. To create

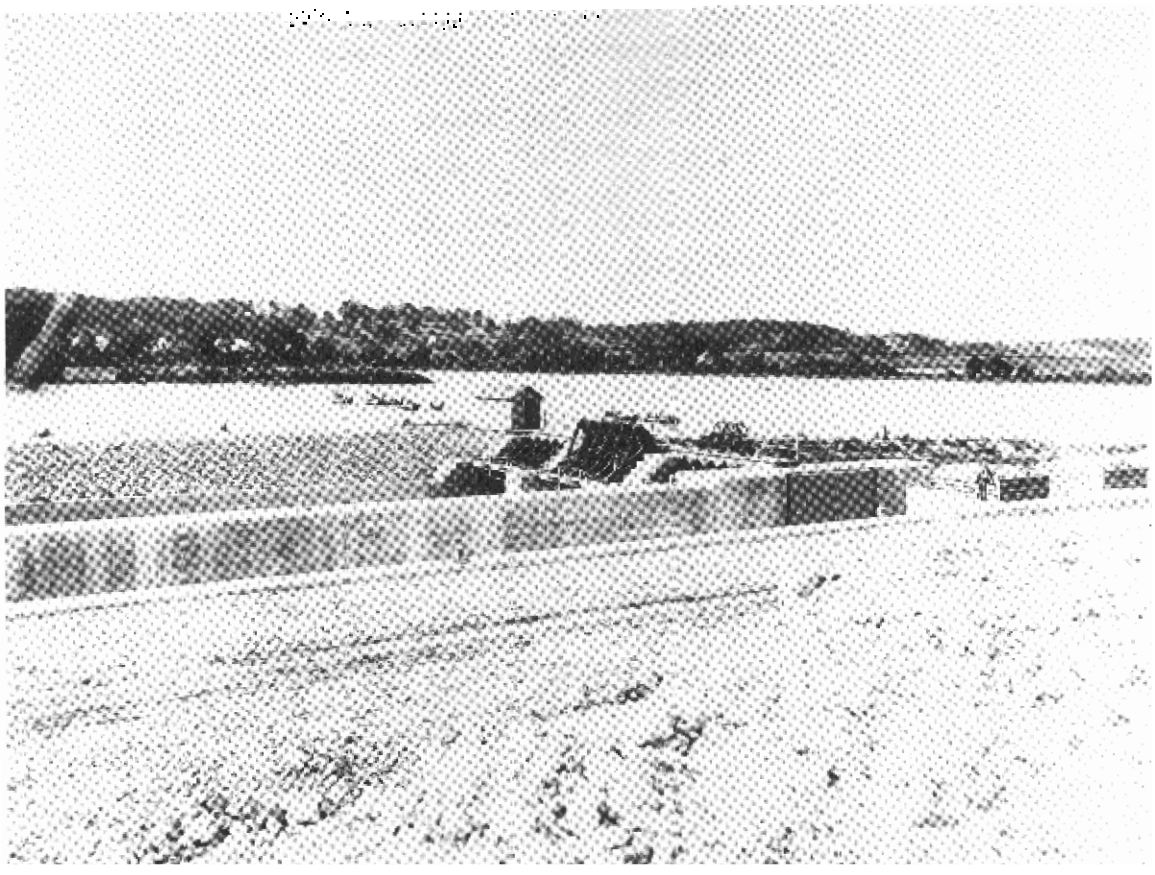
enough water for this route, the 1890 plans called for two shallow dams — one of 5 feet and the other 3 feet — across the Rock River above the mouth of the Green River. However, the completed shallow dams at Milan had already caused complaints from the overflow and soaking of low adjacent farmland. There were fears that the new dams would do the same thing, even though they were designed to be thrown down during high water. Other problems appeared with the Penny's Slough route, Even with the dams, a lot of dredging would be necessary. A channel dredged in the riverbed, with undefined banks, would require much more upkeep and would deteriorate much faster than a prism with clearly defined banks. Further., the crossing of the Green River on this route was bad, and the descent to Penny's Slough was s~ steep that it would have required a flight of locks close together. The alterations of bridges on two major rail lines added an additional problem.

To avoid this difficult route, Wheeler surveyed a new route along the Green River in 1896, a route similar to that surveyed by Major Benyaurd in 1883. The Secretary of War approved this new location on February 1, 1897.

As finally built, the western section of the canal ran from mile 24 at the summit level to d e 62 at the point where the Green River entered the Rock River. Right-of-way for the western section was obtained entirely in 1897 under a new funding status. The River and Harbor Act of June 3, 1896, placed the canal on a "continuing contract" system, limiting to an average of $400,000 the total contract obligations that could be incurred in any given *year.* The continuing contract system supported canal construction from 1897 to 1902.

The slope of the western section was much gentler than that of the eastern section, and most of it was excavated rather than embanked. Wheeler and the contractors experienced few problems with this section.

Feeder Section. A3 engineer in charge of the feeder section, Wheeler turned his attention there



Control works and guard lock at the head of the feeder canal near Starling, Illinois. The Rock River is in the background.

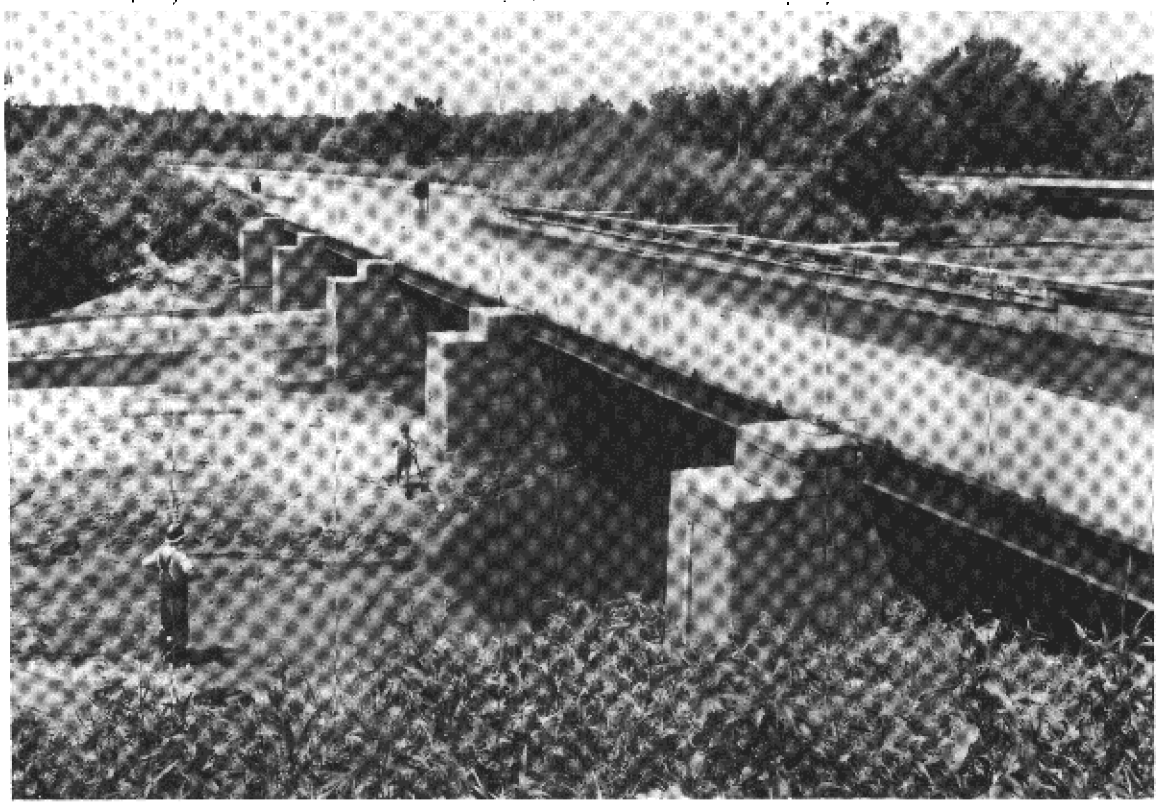
next. In the winter of 1890-91 several residents of the Sterling-Rock Falls area, downstream from Dixon, had written to the Secretary of War suggesting the possibility of moving the head of the feeder from Dixon to Sterling. At their own expense they had made a preliminary examination of their proposed new route, with profiles and estimates.[20]

It was evident that this new feeder line would result in a number of savings, At Dixon, the feeder would have interfered with dty streets and created problems for the town's drainage. Moving the feeder to Sterling would also cut 5.7 miles from the length of the feeder. With the feeder at Sterling, the summit level of the canal could be lowered nine feet, permitting three locks to be cut out of the main line, and the lift lock at the dam to be replaced By a guard lock. Transit time across the main line would be cut by one hour.

For these reasons the Secretary of War ordered Wheeler to resurvey the feeder line. As a result of this resurvey, the Sterling route was adopted, and in 1902 Wheeler moved to Sterling and set up an Engineer Office.

The length of the feeder as finally determined was 29.3 miles, almost all of it embankment. Excavation work was begun in 1899. Here, as at the eastern section, a narrow gauge railroad was used from mile 1 to mile 8 (from the head of the feeder at Sterling) to haul material for the banks. Because the feeder traveled through such level country, it had a fall of only 2.3 feet for the entire length. The feeder met the summit level (mile 17.4 to mile 28.9) at mile 28 just north of Sheffield, Illinois. Because the 40 miles of feeder and summit were all embanked above level and held 100,000,000 cubic feet of water, emergency gates had to be installed to prevent serious flooding of surrounding farmland that might have resulted from a break in the prism. An ordinary mitering gate was placed at mile 23 of the main line. At mile 23.1 of the feeder, at the end of Aqueduct 9 where the feeder crosses the Green River, an emergency gate of the Desfontaines type was placed. This was a buoyant gate moving on a horizontal axis and held down by chains. The guard lock at the head of the feeder protected the canal against sudden surges of water from the Rock River.

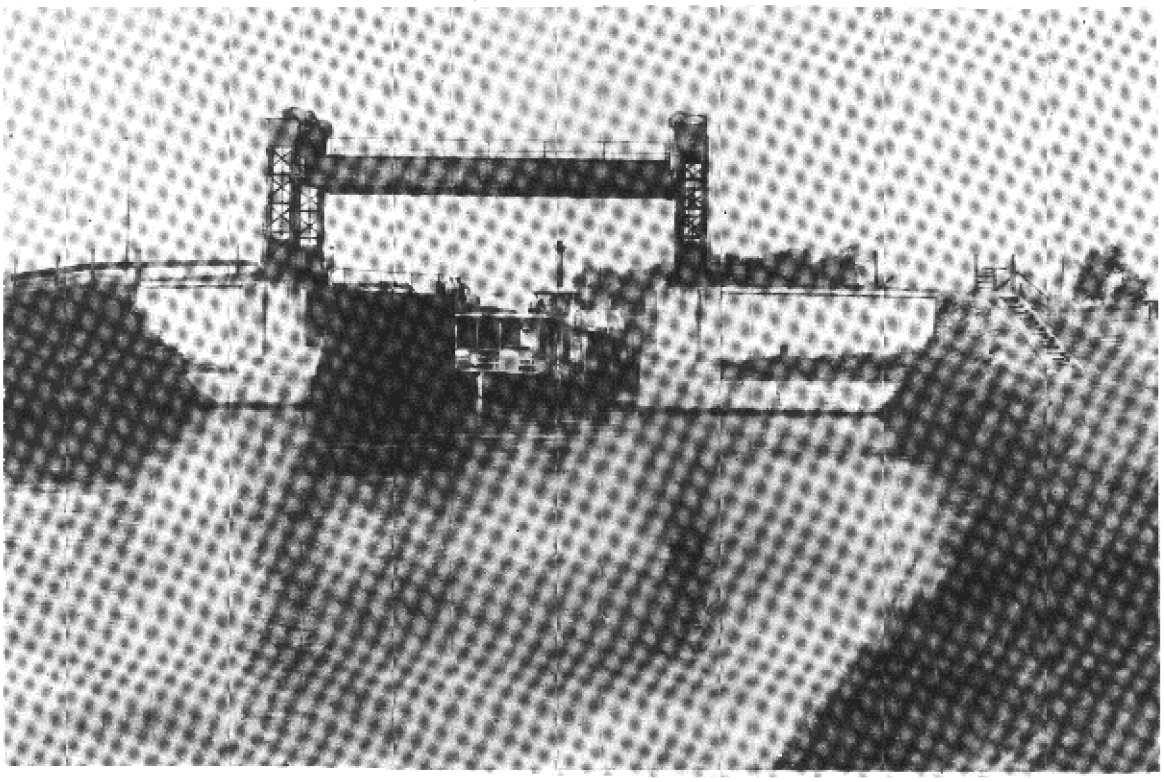
In order to provide enough water for the feeder, a dam had to be constructed at Sterling. Both the dam and the canal's need for water created problems between the Government and the Sterling Hydraulic Company. The company had been guaranteed a minimum amount of waterpower from the Rock River by state charter. They objected to the original plans for the dam, and to several subsequent ones, until the Sterling Dam became one of the main obstacles to completion of the canal. Finally, on December 6, 1906, the Sterling Hydraulic Company agreed in writing to accept plans for the dam at the original site. During most of the five years of litigation, Wheeler had been caught in the middle of the fight, and company representatives had refused even to speak to him. No sooner was the



Aqueducts were needed at those places where the canal crossed another stream. This is Aqueduct No. 1.

agreement between the company and the Government concluded, however, when officials of the company approached Major Riche and asked to borrow Wheeler's services to design and supervise construction of their power station. This compliment to Wheeler's abilities as an engineer was indicative of his valuable services on the canal project.[21]

The movable dam at Sterling was rapidly completed. Its manually operated Tainter gates permitted the passage of 40,000 cubic feet of water per minute during high water. During low water, the water level was raised by the use of wooden flashboards inserted by hand. The Sterling Hydraulic Company operated the six gates adjacent to their plant, while canal employees operated the remainder. The Sterling Dam also contained a navigation lock to pass boats up and down the Rock River.



Although most bridges over the canal were stationary, both swing and lift bridges were used at several locations. This is Bridge No. 40 at Lock 26.

A *guard* lock of the same dimensions as all other locks on the project was placed at the head of the feeder to regulate water flow into the feeder, to serve as an emergency gate for the canal, and to provide boats access to the river,

One other problem during feeder construction came with the 21 highway bridges across the feeder, Area highway commissioners held up completion of the feeder with court litigation over the dimensions of the bridges and the grade of the approaches. In 1906 the courts decided the issue, mostly in favor of the United States, but the litigation did result in a reduction in the clearance of bridges over the feeder from the 17 feet used in the main line of the canal to 12 feet.

The dam at Sterling-Rock Falls created a reservoir for the canal for 16 miles upstream, with a surface area of 2,400 acres. The Government obtained flowage rights for the land inundated by this reser-

voir (known as Lake Sinnissippi) rather than buying the land outright.

Completion of the Project. By 1902 most of the locks were ready for installation of gates and operating machinery. The gates had been left until last because they were made of wood rather than steel, a departure from the original plans in the interest of economy. With no water in the canal to keep the wood wet, the gates would have deteriorated.

There were 33 locks on the canal, 32 on the main line and one at the head of the feeder, With local minor variations, all locks were identical in size and construction. The lock chamber was 170 by 35 feet, with walls 240 feet long and four feet wide. The bottom width of the walls was 45% of the height. Where the lock was built on solid rock, the foundation was levelled with concrete. A majority of locks, however, were built on earth. For these locks, rows of piles were driven into the ground and capped with a grillage of timbers with concrete filling the spaces in between. The floors of all locks were lined with 2-inch pine timbers.

The lower ends of each lock were stepped down and connected to wing walls. For 40 feet above and below each lock, the banks were paved; on the eastern section with rubble and on the western section with concrete.

The lower lock gates of all the locks were wooden miter-type gates angled 70°30' from the center line. Similar miter gates were used for all but 14 of the upper gates. At locks 8 through 21, however, "Marshall automatic gates" were used. These had been designed by Marshall for the Illinois and Mississippi Canal, and have never been used elsewhere.

Marshall had already left the Chicago District before the gates were installed, but Major Willard had an experimental Marshall gate built and installed at Lock 18. A bulkhead was placed at the lower end of the lock chamber and an embankment, constructed across the prism 200 feet above the lock, and the

area filled with water. After the gate was operated successfully several times, plans went ahead for their use.

The Marshall gate was a single gate extending from one lock wall to the other. It raised and lowered on a horizontal axis. The middle third of the gate had a rigid wooden leaf extending out at right angles from the gate an the upstream side. The leaf rested in a watertight chamber which was connected to the lower pool by a spillway pipe. The gab was operated by opening a valve in the spillway, permitting water to exert pressure an the leaf. While the water in the pool was lower than the head of water on the upstream side, the pressure of the head of water held the gate shut. But when the two water levels; grew nearly qual as the lock chamber filled, the pressure on the leaf pushed the gate down and held it below the sill so that boats could pass in or out of the lock chamber. The gate was then raised by shutting off the water pressure on the leaf and letting the watertight gate rise to a closed position from its own buoyancy.

Today only one Marshall gate, at Lock 16, has been restored to operating condition. The gates caused problems by getting stuck and failing to open and close properly.

All of the gates and valves on the locks were operated manually. The lock was filled by two tunnels, one in each lock wall. A butterfly valve at the head of each tunnel was turned by a hand wheal from the top of *each* wall. The lock chamber was emptied by butterfly valves controlling openings in the bottom of the lower gates. These valves were operated by levers from the tops of the gates.

Water for the various levels of the canalwas carried from the summit bvel over the upper end of each lock through a spillway to the lower level. The spillways were made of cast iron pipes behind the lock walls. They ranged in size from 48 inches at the summit level to 18 inches at the lower ends of the canal.

In addition to the locks, the canal project involved construction of a number of other structures. The canal crossed significant streams at nine places, necessitating the use of aqueduct bridges to carry the canal across. These aqueducts rested on poured concrete piers above concrete-filled grillage similar to that of the lock beds. The aqueducts themselves were made of reinforced concrete using steel I-beams, and were timber lined, providing a channel of 39 feet, 6 inches.

The many smaller streams and creeks that intersected the canal prism were carried under the canal bed by several forms of inverted siphons. Twenty-six of these crossings were concrete arch culverts; 38 were pipe culverts.

Highway and railroad crossings provided more of a problem than streams. Because the railroads had gotten to the area first, the canal was crossed by four branches of the Chicago, Burlington, and Quincy Railroad, by the main line of the Chicago, Rock Island, and Pacific in two places, once by the Rock Island and Peoria, and once by the Peoria branch of the Chicago and Northwestern, necessitating the construction of eight railroad bridges. In addition, the Corps of Engineers constructed 67 highway bridges across the canal, as well as two pontoon and one farm bridge. The bridges all had 17 feet of clearance over the canal, and were constructed to cross at right angles to the prism, making many of the approaches awkward.

Several kinds of bridges were used to cross the canal. The first bridges were pony Warren truss type superstructures 98 feet long and, as with all the canal bridges, at least 12 feet wide. Several later Bridges were through Riverbed Pratt truss type, again 98 feet long. The most common bridge on the main line of the canal was the Pratt truss superstructure with 110-foot spans, 18 feet wide. There were more than 25 of these.

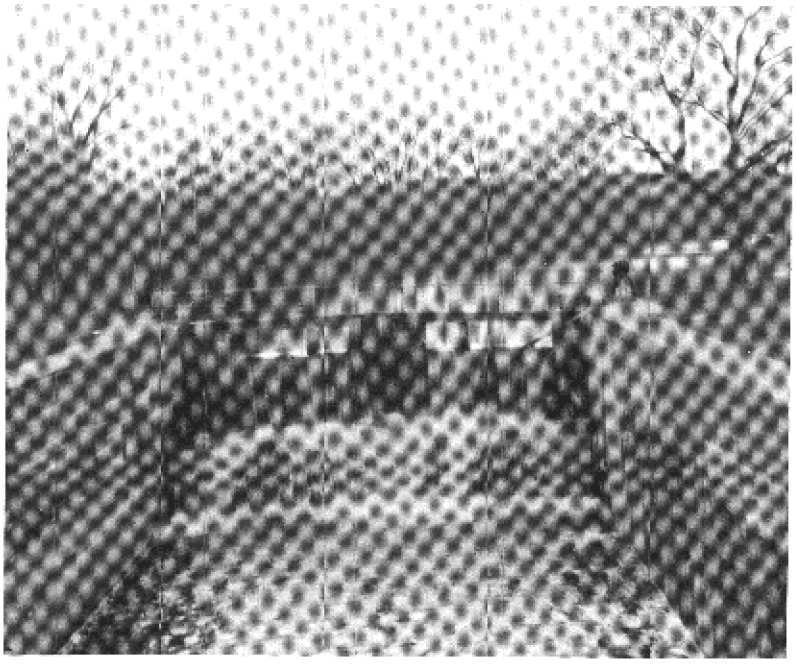
Four highway bridges were movable. Three were through girder lift bridges with 40-foot spans. One, at Lock 2, was a retractable girder bridge with a

54-foot span. This bridge rested on the walls of Lock 2 and retracted to the north bank. On the feeder canal, the majority of bridges were pony Warren truss types with 74-foot spans.

Construction of the Illinois and Mississippi Canal officially ended on October 21, 1907. On October 24, water from the Rock River at Sterling was turned into the feeder. The canal filled slowly. There were fears that the prism, unwatered for up to 13 years of construction, might not hold, but it did.

On November 8, the U.S. steamboat *Marion* became the first boat to enter the canal. With a load of Government officials on board, the *Marion* entered the canal from the Illinois River. It arrived at the Mississippi River on November 15.

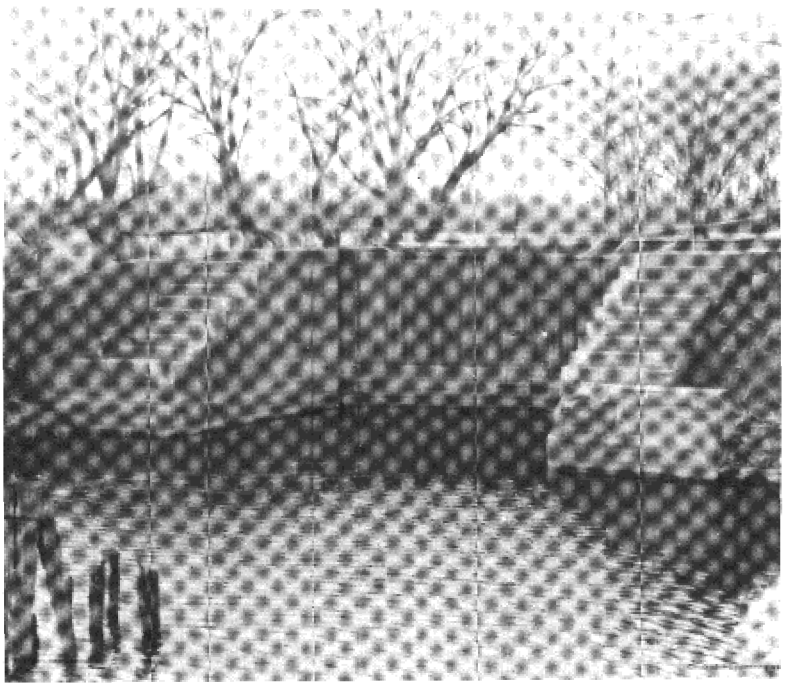
L.L. Wheeler was promoted to Superintendent of the Illinois and Mississippi Canal. He opened the canal to commercial traffic in April 1908. The total cost of the canal to that point had been $7,319,563.39. The labor force on the canal had moved 13,700,000 cubic yards of earth and poured 240,000 cubic yards of concrete over a 15-year period.



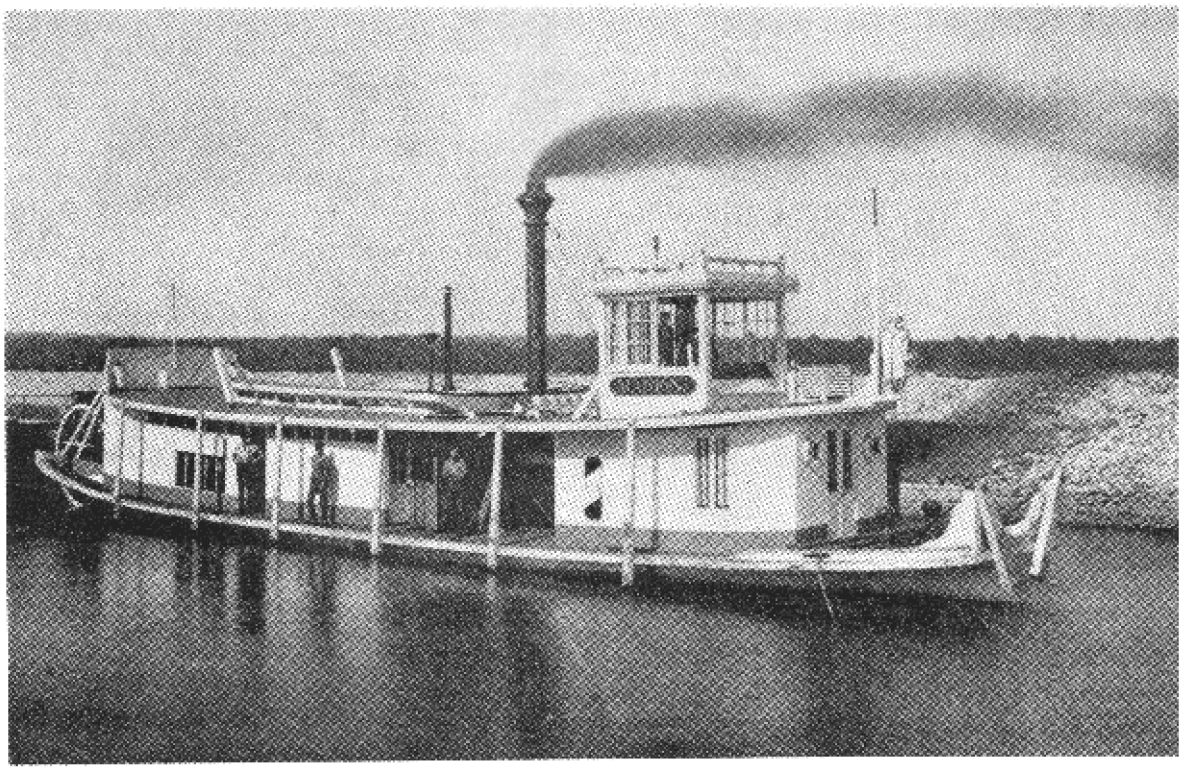
Operation and Maintenance. While the canal was being built, the employment it provided was a significant economic factor in western Illinois, keeping contractors and a large labor force busy. With the close of construction, this labor force disappeared and was replaced by a smaller but important group of employees necessary to operate and maintain the canal.

To operate the canal, sub-sections varying from 4 to 12 miles in length on both the main line and feeder were placed in charge of 14 overseers. Each overseer was provided with a house on the canal right-of-way, 13 of them built by the Corps of Engineers. Seven of the houses were of a common design; two-story frame, with eight rooms, on a 24-by 30-foot foundation. The other six overseers' houses constructed by the Corps were slightly larger and more elaborate, presumably because these overseers had additional responsibilities. The larger houses occurred at places such as the head of the feeder and at Lock 19, where there were additional shops and warehouses.

Under each overseer were the lockmen at each of the locks, and patrolmen to guard canal property.



These views of the upper and lower gates of Lock 2 show typical lock construction for most of the 32 locks on the main canal and on the lock at the head of the feeder. Fourteen of the locks had submersible upper gates designed by Captain W. L. Marshall, District Engineer in charge of the project.



The Rack Island District boat assigned to operation and maintenance of the canal was the steamer *Marion.* On November 15, 1907, the *Marion* became the first boat to pass the entire line of the canal.

During the summer this work force expanded to handle such maintenance and repair duties as cutting grass, resurfacing the tow path, and repairing banks. The Corps also provided 38 houses for the lockmen and patrolmen. Thirty of these were identical two-story frame, with gambrel roofs and seven rooms, on a 22- by 28-foot foundation. The lockman's house at mile 20 was the same design as the others, but was made entirely of concrete. Each residence was provided with barns and equipment sheds.

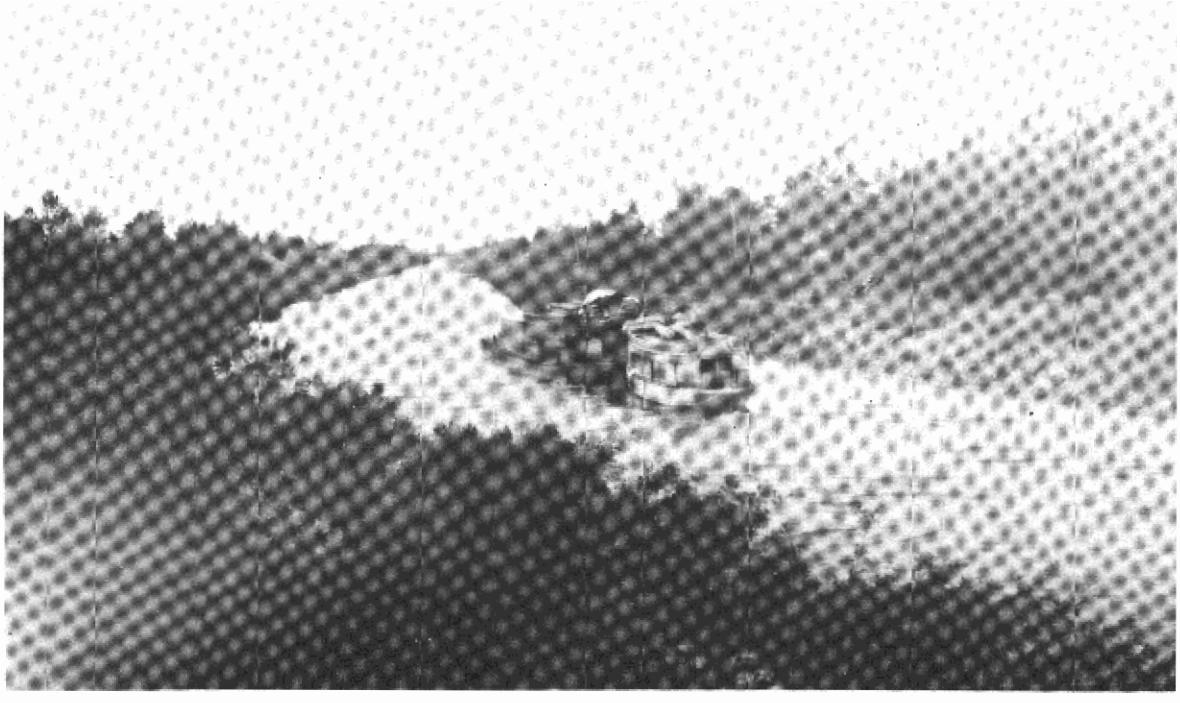
The Corps required overseers, lockmen, and patrolmen, whose jobs were year around, to live in these houses, deducting the rent from their salaries. These permanent residents of the "canal community" were encouraged to keep livestock. The technical limit for each household was three cows and their offspring, although several employes kept dairy or beef herds up to 30 head. The cattle grazed free on the canal right-of-way, which helped keep the grass and weeds down. Some f a d e s also kept chickens, pigs, and horses.[22]

Other buildings on canal property included warehouses at several locations, blacksmith shops, ice houses, repair shops and office buildings. Concentrations of these service buildings stood at the end of the feeder, at Lock 19, and at mile 26, In addition, a boat ways at mile 17.7 on ths summit level provided a place where boats could be taken out of the canal for repairs; and a boatyard known a3 the Silver Lake Boatyard at the Milan section housed the Government fleet during the winter.

Because of the common privileges the canal employees shared, but also because of their common liabilities—especially not being able to be part of a more regular settled community—the canal employees formed a small world of their own, linked loosely together by similarity of occupation and interest. These Corps employees and the hands who worked on the boats and barges formed a social unit "typical of canal life on all American canals."[23]

The small steamer *Mary Mac* pushing a barge of lumber past Mile 2 on the feeder shortly after the canal opened to traffic.

The opening of the Illinois and Mississippi Canal to traffic in 1908 brought attention once again to the navigation limitations at; both ends of the canal:



the Upper Mississippi River's 4½-foot channel and the antiquated Illinois and Michigan Canal. While the Illinois and Mississippi Canal was capable of passing boats 140 feet long with a 34-foot beam and 640 gross tons displacement, the Illinois and Michigan Canal could accommodate boats no longer than 108 feet by 17 feet;, drawing a maximum of 4½ feet of water. From the beginning of the Engineer surveys for the Illinois and Mississippi Canal, all reports and proposals had been predicated on the improvement of this other canal. In 1882, however, the Government refused an offer by the Illinois General Assembly to cede the rights to the Illinois and Michigan Canal to the United States (which was then supposed to improve it), and the canal had continued to deteriorate.

Except at high water seasons, the Upper Mississippi was not much better in 1908. For this brief period in it3 history, then, the Illinois and Mississippi Canal was too large for its connecting links.

It moved quickly from being too large to being too small. At the Mississippi end, Congress authorized a 6-foot channel from St. Louis to St. Paul on March 2,1907, and work on that had already begun. The new Moline lock and a proposed lock and canal at LeClaire, Iowa, met the new 6-foot specifications with locks 360 by 80 feet, In 1912 a new water power dam at Keokuk drowned out the Des Moines Rapids and the small Government canal, replacing it with a new 400- by 90-foot lock.

The last chance for renovation of the Illinois and Michigan Canal ended in 1900 when the new Chicago Sanitary and Ship Canal, with a depth of 26 feet, opened to the Des Plaines River at Lockport, Illinois. In 1901 this spacious channel reached Joliet on the Illinois River. Phns for this channel had been drawn in 1892 by the Chicago Sanitary District to reverse the flow of the Chicago River which had been dumping raw sewage into Lake Michigan and contaminating the Chicago water supply. Its use by river traffic was an important extra, but the Illinois and Mississippi Canal now became the smaller canal of the system.

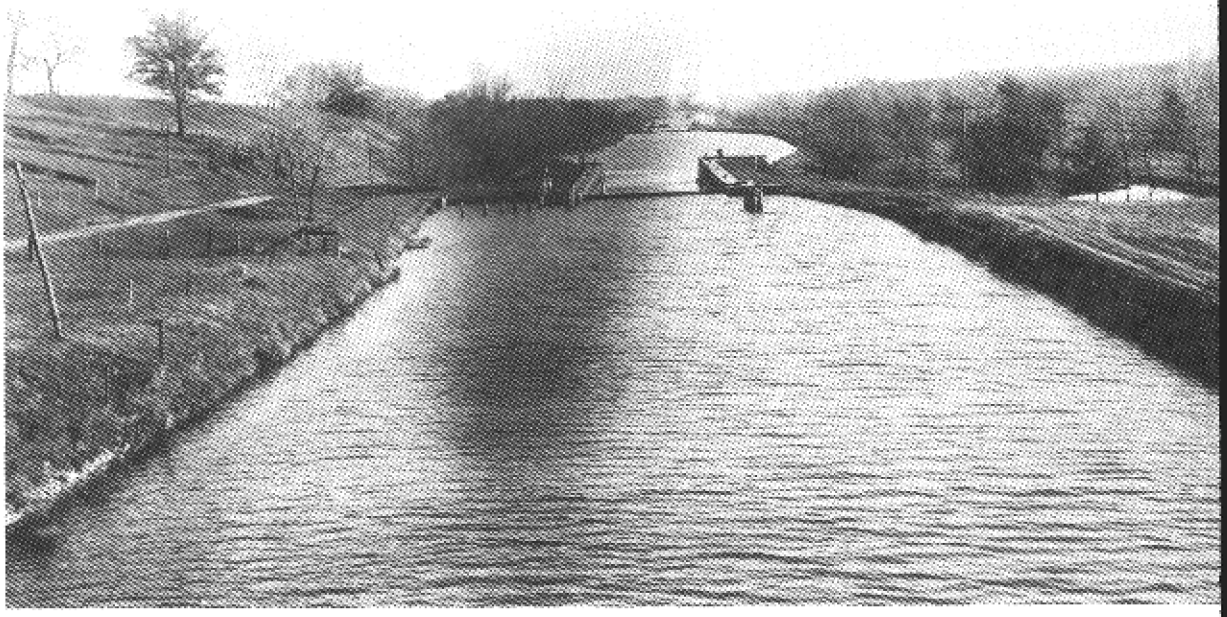
The Illinois and Mississippi Canal was further dwarfed during the 1930's by construction of the 9-foot channel between St. Louis and St. Paul, and by completion in 1933 of a similar project on the Illinois River. Locks on both rivers were now 600 feet long and 110 feet wide.

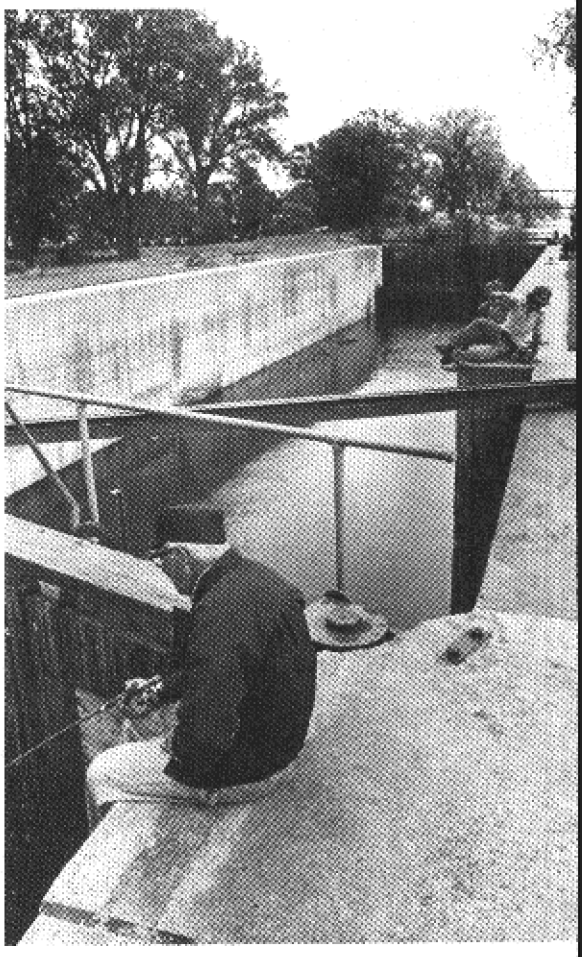
Size was not the only problem for the canal. Its opening in 1908 coincided with a steady decline of river traffic that continued for the next two decades. Use, then, of the canal was disappointing from the beginning. Its theoretical capacity, at extreme, was thrss boats per hour, each way, or 144 boats per day. At 640 tons each, and a navigation season of 200 days (the shortest possible), the canal was capable: of handling 18,432,000 tons.[24] Even taking L.L. Wheeler's more realistic estimate of 90 boats per day, the canal could handle more than 10,000,000 tons per year, a figure the canal never came close to approaching.

A3 early as 1915, there was talk of abandoning the canal Its peak use, reached in 1914, had only been 12,222 commercial tons. By 1915 the anal had not managed to attract a single private company to establish regular freight service—a necessity if the canal was to do well. Two grain elevators built along the feeder in 1910 by the Smith-Hippen Company shipped modest amounts of grain an the canal to distilleries in Peoria and Pekin, Illinois, but only a few other elevators were built along the canal. Even these modest grain shipments accounted fer 55% of the canal's commercial cargo from 1909 to 1913.

In 1910 the Morton Salt Company shipped 1,200 tons of salt from Chicago to Davenport on the canal, but stopped after making another shipment of 2,000 tons in 1913 because of the deteriorating condition of the Illinois and Michigan Canal.[25]

Use of the Illinois and Mississippi Canal picked up briefly In the 1920's when the State of Illinois began improving the Illinois River. Several private firms began to offer service3 along the canal, and in 1929 the canal's use reached its all-time high: 30,161 tons, a bit over 1/600 of its theoretical potential,





The Illinois and Mississippi Canal shortly after completion.

The River and Harbor Bill of July 3, 1930, provided a glimmer of hope for the canal by authorizing an examination of the canal to determine the feasibility of enlarging the channel to 9 feet and the locks to the size standard on the Mississippi's new 9-foot channel project. Part of this survey included a preliminary examination for a new 9-foot channel from Janesville, Wisconsin, to the head of the feeder at Sterling.

The report was not finished until 1937. In it, the Rock Island District noted that the existing limitations of the canal prevented its commercial success. The packetboat trade it had been designed for had been replaced by larger and more modern boats and barges. The report recommended improving the canal to the proportions consistent with the 9-foot channel.

A hearing was held in Washington, D.C., in 1939, at which a projected heavy use of an improved canal was argued. Proponents of improvement pointed out that construction would also provide many new jobs at a time of great unemployment. They also pointed out the irreversible nature of abandonment. The Chief of Engineers left the canal in limbo by refusing to recommend abandonment but also concluding that improvement was not economically feasible. Commercial traffic continued on the canal, but in gradually diminishing numbers.

Today, the canal is maintained by the State of Illinois as a recreation and wildlife area known as the Hennepin Canal State Parkway, with a visitor's center near Sheffield, Illinois.

In 1945 the Rock Island District Office issued another report favorable to improving the canal, but a review by the Board of Engineers for Rivers and Harbors concluded that the cost would be too great and the benefits doubtful.

Following this negative report, a last major decline in use of the canal began. Only 866 commercial tons moved on the canal in 1946, and 394 tons in 1947, all of it local traffic. On April 7, 1948, the Rock Island District issued a notice putting the canal service on a limited basis. With one day's notice, both commercial and recreational traffic could use the canal on Thursdays and Fridays. At

all other times, commercial traffic could use the anal provided they gave a week's notice.

No commercial tonnage was reported in 1948. The only supplies moved on the canal were for maintenance. The canal itself had deteriorated so much that less than four feet of water remained in the Rock River portion of the main line, with barely four feet remaining in the feeder.

In 1951 the Chief of Engineers suspended lock operations and everything but maintenance on seven canalized waterways that no longer served commercial traffic. Among these was the Illinois and Mississippi Canal. On June 21, 1951, Colonel B.C. Snow, Division Engineer of the Upper Mississippi Valley Division at St. Louis, issued a public notice for "Cessation of Operation for Navigation/Illinois and Mississippi (Hennepin) Canal." With this notice the canal ended ita career as a navigable waterway.

The Hennepin Canal State Parkway. With the notice of closing, the Rock Island District Office began a detailed study of the difficult problem of what;to do with the canal. The District considered several ways of disposing of the canal, They estimated that draining and abandoning the canal would cost $1,700,000, while putting the canal property back to its original pre-canal state would cost $10,000,000. Even minimal maintenance meanwhile would run more than $100,000 per *year,* a figure which a serious break or further deterioration would increase. Many of the highway bridges were in dangerous disrepair and needed replacing. The District Engineer recommended abandonment.

From the moment the canal closed, however, there was interest especially among area residents in turning the canal into a state or national. park, These residents were supported by groups such as the Izaac Walton League and by prominent state figures such as Senator Everett Dirksen and Governor Adlai E. Stevenson. The canal was historically important as the last long stretch of anal left In the United States in reasonably complete shape, an im-

portance enhanced by its experimental use of concrete and other innovative construction methods.

Just as important to residents near the canal was its *recreation* potential, From its opening, it was as much used by excursion passengers—several thousand a year—as by commercial traffic. It had been used for fishing, swimming, and small boating. For example, the Rock Island YMCA in 1911 was given permission to hold swimming classes in the Milan section of the canal. The canal banks provided scenic areas fer hiking and picnicking due to the Corps' planting of large areas of walnut, elm, and catalpa trees along the right-of-way for several years after the canal was opened. The trees came from experimental nurseries established by canal employees at nine places along the canal. The tree plantings helped stabilize and protect the banks from erosion. The tow path along this narrow forest was ideally suited to biking.

The idea of using the canal property as a state park grew more and more appealing to the state officials. With support from conservation groups and under the leadership of Governor Stevenson, the Illinois General Assembly petitioned the Federal government ta keep the canal property for recreation and conservation use. As a result, the canal was placed on stand-by maintenance pending final disposal. From 1952 to 1955, the water level was reduced to five feet, and less than $160,000 per year was spent on maintenance During this period the Illinois Department of Conservation and the National Park Service also recommended that the canal be modified for recreation.

In 1953 the Illinois House and Senate formed the Illinois-Mississippi Canal and Lake Sinnissippi Commission to look for ways of preserving the canal and *the* lake for recreation. Any such preservation would involve turning the property into a state or national park, but the Commission soon discovered that several difficulties lay in the way. First, the Federal government had obtained flowage easements to the land under Lake Sinnissippi rather than clear title. With the canal no longer a navigable waterway, the land may legally have reverted to the

original owners. Secondly, the Illinois Constitution prohibited the legislature from making any appropriations for railroads or canals, even, the Commission decided, for recreational use.

A third problem was funding. During the last years of the canal operation and into the fifties, little repair and only minimal maintenance was performed. Many canal structures, especially gates and bridges, were worn out. The Corps of Engineers had been reluctant to spend money unnecessarily while abandonment was a likelihood, and the State of Illinois could hardly afford to accept the canal in its existing condition and then restore it.

The legal hurdle regarding the use of state funds for canals was overcome by the Blue Ballot of 1954. This referendum removed the constitutional prohibition against the use of funds for canals.

After several unsuccessful attempts in the Illinois legislature to pass bills providing for rehabilitation of the canal and its transfer to state ownership in 1955-57, an Omnibus Bill was signed into law by President Dwight D. Eisenhower on July 3, 1958. The act authorized the Corps of Engineers to spend $2,000,000 to put the canal and lake into condition for recreation use and to work out a transfer agreement with the state. The bill also provided that the Corps would get fee and simple title to the land under Lake Sinnissippi and gave the State of Illinois permission to use the necessary water from the Rock River for canal recreation purposes.

In 1960 the Commission, the Corps of Engineers, and the State of Illinois worked out a renovation schedule using the $2,000,000 as far as it would go, with the work to be completed by 1964. All three groups knew that far more than $2,000,000 would be needed to meet the State's specifications. In 1962 Congress added another $800,000, still far from the estimate by the State and the Commission of $10,000,000.

During this period of transfer, two final attempts arose to renovate the canal for commercial use. In

1955 and again in 1965, local citizens campaigned actively to restore the canal and enlarge it to accommodate the growing river traffic an both the Illinois and Mississippi Rivers. By 1965, however, the estimated cast of such a project had risen to between $100,000,000 and $200,000,000, and the Corps of Engineers rejected another survey.

In 1966 Secretary of the Interior Stewart Udall toured the canal as a potential national park site, But he later rejected this option.

In 1969 representatives of Illinois and the Federal Government agreed on a final appropriation of *$5,728,000* for rehabilitation of the canal. The work was to be done by the Corps of Engineers and the State was to accept title to the property before all the work had been completed. This paved the way for the acceptance by the State of Illinois on August 1, 1970, of full ownership and title to the Illinois and Mississippi Canal.

During the 1970's both the Corps of Engineers, using Federal funds, and the Illinois Department of Conservation, using state funds, continued restoration work.

All but four of the locks have had the upper gates replaced by concrete headwalls by the Carps to maintain a water level of five feet. Several of the bridges were removed and replaced by large culverts over which roadways were constructed. Soma of this had been done by counties faced with unsafe bridges and strapped for money to replace them. Many of the wooden buildings—warehouses and shops—are gone, but others remain, including many of the houses constructed for overseers and lockmen. Most of the canal remains close enough to its original form to give a glimpse, at least, of what it once was.

Since 1970 the Department of Conservation has operated the canal as the Hennapin Canal Parkway State Park. Mile 13.8 through mile 17.9 has been designated as an interpretive area. This section includes all of the right-of-way, more than four miles

of prism and tow path, one aqueduct, and seven locks (15 to 21), including the working Marshall gate at Lock 16. The area also includes a railroad bridge, four highway bridges, including one of the original lift bridges, and eight overseers' and lockmen's houses.

Near mile 22 east of Sheffield, a Visitor's Center has been built on 400 acres of land that is being restored to prairie. In addition to information and exhibits, the Visitor's Center has day use facilities, a small boat harbor and launching area, from which a boater can travel all 40 miles of summit and feeder. The restored prairie at the Center contains a migratory waterfowl observation area and a natural plants demonstration area. A few miles east of the Center a portion of the north canal bank is maintained as original prairie.

Several places along the canal have been set up for picnicking and fishing. The towpath is kept mowed so that it can be used for biking and hiking. In winter all 104 miles of towpath are maintained as a snowmobile trail. Sections of the canal are kept stocked with game fish by the Department of Conservation. Near Wyanette is a canal campsite for tent camping.

The Hennepin Canal today has changed its name back from the title Congress gave it, and users are returning, not this time to haul coal or grain or gravel, but to enjoy what must be one of the most unusual state parks in the United States. More than 300,000 people each year now visit and use its facilities.

Notes

chapter 5

Much of the detail of the planning and construction of the Illinois and Mississippi Canal is contained in the manuscript collections of the Chicago District and Rock Island District, Corps of Engineers. Nearly all of these manuscripts are located in two places: the Chicago Federal Records Center and in the historical files of the Rock Island District Office at Rock Island, Illinois. Here are the letterbooks of the officers in charge, reports of field operations by the engineers in charge of each section, surveys, bills of goods, etc. The Chicago Federal Records Center has most of the reports by the District Engineers in charge of the project, while the Rock Island District files have most of the reports of field operations submitted by L.L. Wheeler and James C. Long. Both manuscript collections are extensive. In addition, the Rock Island District Office has a large collection of construction photographs, as well as maps, charts, and drawings of the canal and its structures.

The details of the planning and construction of the canal assembled by Mary Yeater for the National Register of Historic Places Inventory have also been most helpful, particularly in the details of construction. The description of the canal that Ms. Yeater assembled for the National Register is the single most complete source of information on the Illinois and Mississippi Canal.

1. Madeline Waggoner, *The Long Haul West*, (New York: Putnam, 1958), p. 15.

2. *Ibid.*

3. John Joseph Steinbach, "History of the Illinois and Mississippi Canal," Unpublished M.A. thesis, Illinois State University, 1964, p. 4.

4. The Geneseo *Republic*, March 6, 1834, p. 1.

5. *Ibid.*

6. U.S. Congress, House, *Report of Brevet Maj. Gen. James H. Wilson, Lieutenant Colonel Thirty-fifth Infantry, on the Survey of the Rock River in the States of Illinois and Wisconsin*, Executive Doc. 15, 40th Congress, 1st Session, p. 1.

7. *Ibid.*, p. 10.

8. And *Report*, 1891, p 2634.

9. *Annual Report*, 1883, p. 1709ff.

10. Steinbach, p. 19.

11. *Annual Report*, 1887, p. 2145.

12. Wilbert L. Bonney, "Descriptive and Historical Sketch of the Illinois and Mississippi Canal," reprinted from the *Annual Report*, 1908, p. 7.

13. O.H. Ernst, Letterbook No. 1, Northwest Division, Rock Island District, 1901—, RG77, Chicago Federal Records Center.

14. *Annual Report*, 1891, p. 2650.

15. *Ibid.*, p. 2651.

16. William A. Davis, *History of Whiteside County, Illinois* (Chicago: The Pioneer Publishing Company, 1908), p. 283.

17. The Rock Island *Argus*, October 22, 1907, p. 5.

18. Major W.L. Marshall, "Illinois River," Record Book No. 10, Chicago District, RG77, Chicago Federal Records Center.

19. Colonel O.H. Ernst.

20. Bonney, p. 12.

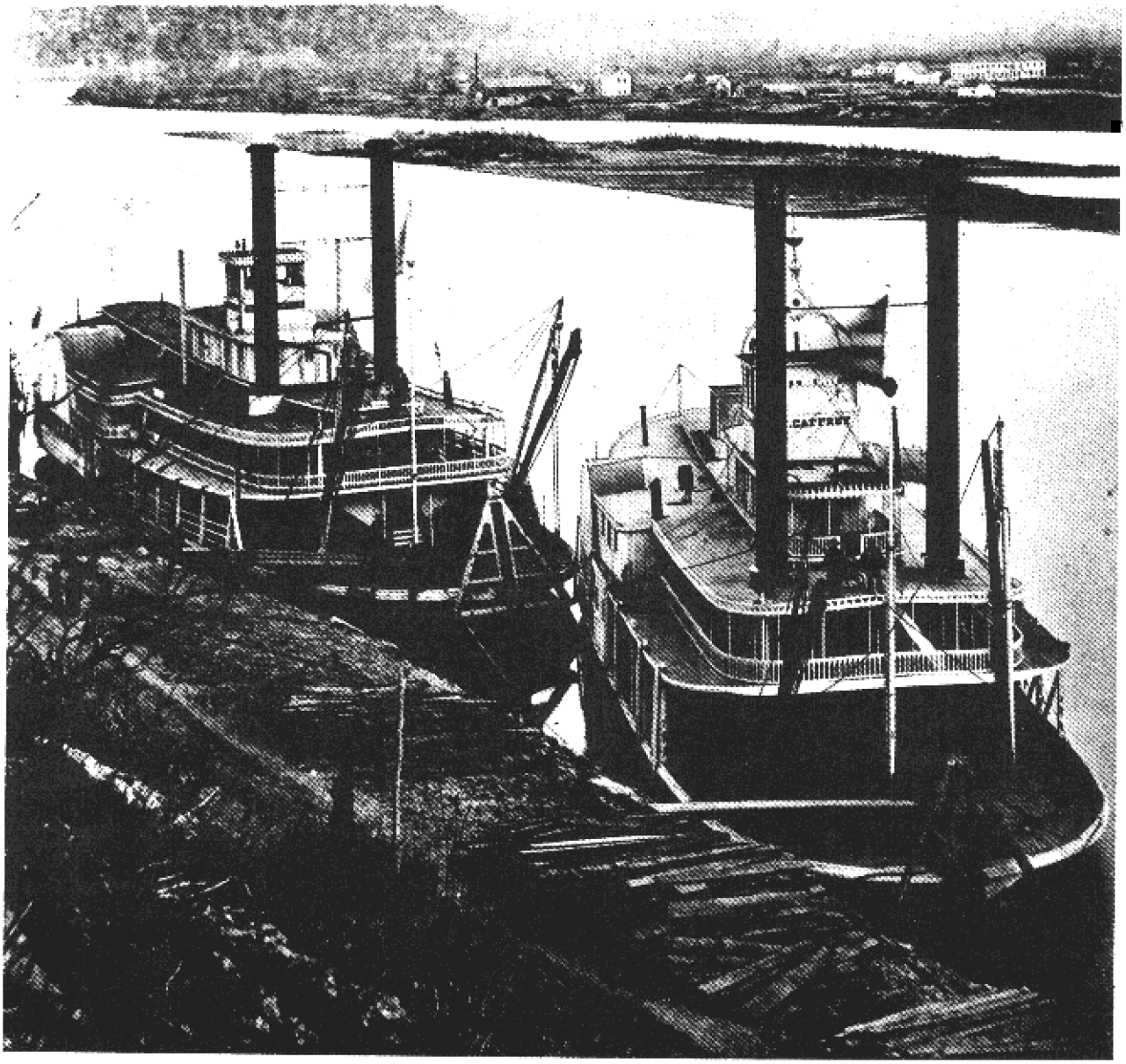
21. Major Charles Riche, Letter to the Chief of Engineers, August 13, 1907, Letters Sent, Rock Island District, Rock Island District Historical Files.

22. Mary Yeater, "Hennepin Canal Historic District," National Register of Historic Places Inventory—Nomination Form, Section 8, p. 18.

23. *Ibid.*

24. *Ibid.*, p. 19.

25. *Ibid.*, p. 21.



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